EnviroQual

F1-204

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Kate Hansel
CALFED Bay-Delta Program
1416 Ninth Street, Suite 1155
Sacramento, CA 95814

Dear Ms. Hansel,

Please find enclosed 10 copies of a proposed project, "Development of Guidance for the Use of Contaminated Dredged Sediments to Enhance Delta Levee Stability and Shallow Water Habitat" for CALFED-Category III support. I believe this proposal inquiry conforms to CALFED RFP requirements. If there are questions regarding this inquiry, please contact me.

Sincerely yours,

G. Fred Lee, PhD, DEE

GFL:
Enclosures

F1-204

Development of Guidance for the Use of Contaminated Dredged Sediments to Enhance Delta Levee Stability and Shallow Water Habitat

Submitted by
G. Fred Lee, PhD, DEE
G. Fred Lee & Associates

The Problem- Several of the Delta levees are structurally weak and need reinforcement. One of the potential, cost-effective approaches for enhancing levee structural stability is through the use of dredged sediments. While this approach can be readily implemented for "clean" freshwater dredged sediments, there is only a small amount of this type of sediment available for levee enhancement (LE). There are, however, large amounts of "contaminated" dredged sediments from freshwater areas and from marine areas that could be used for Delta LE. However, there is concern that the contaminants in these sediments would be released into the Delta waters upon placement of the dredged sediments on Delta levees. This release could lead to pollution of Delta waterways by constituents that would be detrimental to the beneficial uses of the Delta and its aquatic resources.

There is considerable interest in the CALFED Ecosystem Restoration Program in the development of increased shallow water habitat (SWH). One of the potential sources of sediments for increasing SWH is "contaminated" dredged sediments. At this time, the approaches being used to evaluate whether the contaminants in dredged sediments are potentially adverse to aquatic and terrestrial organisms that would inhabit SWH do not adequately incorporate the aqueous chemistry and toxicology of constituents in the dredged sediments that could be adverse to the use of these sediments for SWH development.

It is proposed that CALFED provide support for Dr. Lee to develop guidance that can be used on a site-specific basis to determine whether the sediments from a particular location could be safely used to enhance Delta levee stability and/or provide additional SWH.

Approach- Dr. G. Fred Lee will work with CALFED management and others to develop guidelines that could more appropriately and reliably evaluate whether chemical contaminants, such as heavy metals, chlorinated hydrocarbons, nutrients, PAH's and salts, present in dredged sediments would be adverse to local ecosystem quality and/or Delta water quality when used for either Delta LE or the development of SWH. Dr. Lee is familiar with the literature and the vast amount of work that has been done through the Corps of Engineers and others on the disposal and beneficial uses of contaminated dredged sediments. He is also familiar with the significant technical problems that exist today in regional water quality control board regulatory approaches for evaluating the potential water quality and ecological problems that could develop from the use of dredged sediments that contain one or more potential pollutants. He finds that, typically, the regulatory approaches being used tend to inappropriately evaluate the potential impact of the contaminants in dredged sediments as they may impact the beneficial uses of the sediments for LE and/or development of SWH.

Dr. Lee will develop a discussion of the technical problems in using contaminated dredged sediments for Delta LE or SWH. This review will include a discussion of the various perspectives of those interested in these areas, such as those wishing to use contaminated sediments for LE or SWH development, regulatory agencies that must protect public health, environmental quality and water resources, agricultural interest that could be impacted by contaminants in dredged sediments and environmental groups as well as others who are interested in this area. Dr. Lee's review would also specifically include a discussion of the current regulatory approaches being used in the Delta that govern both the use of contaminated sediments for LE as well as for the development of SWH. His review will provide guidance on how the regulatory guidelines and approaches could be changed to protect the beneficial uses of the Delta system associated with the use of certain types of contaminated dredged sediments within the Delta for LE and/or SWH development.

Dr. Lee will organize a panel of interested parties to provide guidance on the development and implementation of one or more demonstration projects that would specifically address data gaps that exist on the expected behavior and impacts of various types of contaminants in dredged sediments when used for LE and SWH.

Budget- The proposed budget for the project is $69,550. These funds will be used primarily to support Dr. Lee's activities while serving as a consultant to CALFED, and others associated with developing the beneficial uses of contaminated dredged sediments in the Delta. A proposed budget for this project is attached.

Qualifications - For a 30 year period, until 1989, Dr. Lee taught graduate environmental engineering and environmental science courses at several major US universities. During this time, he conducted over five million dollars in research devoted to defining the sources, water quality and public health significance, and developing control programs for chemical constituents in aquatic systems. He has published over 650 papers and reports on his work. Since 1989, he has been a full-time consultant to governmental agencies and industry in the US and other countries. One of his primary areas of activity during his 37 year career has been managing contaminated aquatic sediments. Most of his work in this area has been concerned with the management of contaminated dredged sediments. He has conducted over a million dollars in research in this topic area and was instrumental in the development and evaluation of the Corps/US EPA procedures that are now used for regulating open water disposal of contaminated dredged sediments. He is also familiar with upland disposal of dredged sediments as they may impact water quality due to contaminants in the sediments. Additional information on Dr. Lee's qualifications to undertake this project is available on his web site (http://members.aol.com/gfredlee/gfl.htm).

Monitoring and Coordination - This project will formulate approaches for monitoring of CALFED demonstration projects and full-scale implementation projects devoted to the use of contaminated dredged sediments for levee enhancements and/or shallow water habitat development. It will be coordinated with the DWR and other responsible for Delta levees and channels, regulatory agencies and those concerned with the disposal of contaminated dredged sediments.

Development of Guidance for the Use of Contaminated Sediments to Enhance Delta Levee Stability and Delta Ecosystem Habitat Enhancement

Submitted by

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Contact Person: G. Fred Lee

Many individuals concerned with Delta water quality and aquatic resource management with particular emphasis on improving levee stability and development of Delta shallow water habitat will be participants in this project.

RFP Project Group Type: Other Services

Project Description

Background

Several of the Delta levees are structurally weak and need reinforcement. One of the potential, cost-effective approaches for enhancing levee structural stability is through the use of sediments dredged from navigation channels as part of channel maintenance. While this approach can be readily implemented for "clean" freshwater dredged sediments, there is only a small amount of this type of sediment available for levee enhancement (LE). There are, however, large amounts of "contaminated" dredged sediments from freshwater areas and from marine areas that could be used for Delta levee enhancement. However, there is concern that the contaminants in these sediments would be released into the Delta waters upon placement of the dredged sediments on Delta levees. This release could lead to pollution of Delta waterways by constituents that would be detrimental to the beneficial uses of the Delta and its aquatic resources. There is also concern about chemical contaminant phytotoxicity to plants that would normally inhabit the levees and provide for levee stability.

There is considerable interest in the CALFED Ecosystem Restoration Program in the development of increased shallow water habitat (SWH). One of the potential sources of sediments for increasing SWH is "contaminated" dredged sediments. At this time, the approaches being used to evaluate whether the contaminants in dredged sediments are potentially adverse to aquatic and terrestrial organisms do not reliably incorporate the aqueous chemistry and toxicology of constituents in the dredged sediments that could be adverse to the use of these sediments for SWH development. The basic problem is that the regulatory approaches being used to evaluate whether potential pollutants in contaminated dredged sediments are largely based on co-occurrence relationships that have been found to be unreliable for predicting the toxicity and/or bioaccumulation of contaminants in subaqueous sediments which were used as the basis for developing the co-occurrence.

The San Francisco Regional Water Quality Control Board's (SFRWQCB) "guidelines" for the use of dredged sediments for wetlands developments using contaminated sediments are based on what is well known to be technically invalid approaches. Representatives of the US Army Corps of Engineers Waterways Experiments Station in Vicksburg, MS who have conducted millions of dollars of research on the beneficial uses of dredged sediments and others who are highly knowledgeable on the issues that should be considered in upland or wetland disposal of contaminated dredged sediments, such as the proposed principle investigator for this project, Dr. Lee, testified at the SFRWQCB hearing devoted to developing the "guidelines" that the proposed approach was technically invalid. The guidelines over regulate some constituents and under regulate other constituents in dredged sediments with respect to their potential impacts on aquatic and terrestrial life that become associated with the dredged sediment disposal/management area.

The basic problem is that the physical, chemical, and biological environments of the subaqueous sediments for which the regulatory approaches were formulated is significantly different from the physical, chemical, and biological environments that will exist associated with the use of the contaminated sediments for levee enhancement and/or shallow water habitat development. The difference in these environments controls the release of constituents from the dredged sediments and

therefore their impact on Delta water quality and ecosystems, as well as terrestrial life that would inhabit areas where the contaminated dredged sediments are managed. Constituents such as heavy metals which are in non-toxic, non-available forms in aquatic sediments can become toxic and available in upland disposal areas.

The SFRWQCB staff acknowledged that the guidelines they had recommended to the board for adoption may have technical problems. It was their recommendation, however, that since there was need for guidelines in order to proceed with the development of beneficial uses for dredged contaminated sediment, that these guidelines be adopted as initial guidelines and that they would be revised as new information becomes available. Unfortunately, the original, technically invalid guidelines are still in place today.

The Central Valley Regional Water Quality Control Board (CVRWQCB) staff has indicated that they need to develop guidelines that would enable the use of contaminated dredged sediments for levee enhancement and/or shallow water habitat development that would protect the beneficial uses of the Delta from the potential adverse impacts of the contaminants in the sediments. There is need for CALFED/DWR to support a comprehensive review of what is known today about the reliable assessment of the potential impacts of contaminated dredged sediments when used for either Delta levee enhancement or shallow water habitat development. This review should include specific recommendations on the types of studies needed to provide the necessary information to put the beneficial use of contaminated sediments for levee enhancement and/or shallow water habitat development on a more technically valid basis than exists today. There is also need for CALFED/DWR to support several field demonstration projects which would provide the additional, site specific information needed to develop the information base upon which CALFED/DWR and the regulatory agencies can support the use of at least some of the contaminated sediments for beneficial uses within the Delta while still protecting Delta water quality and ecosystems.

It is proposed that CALFED provide support for Dr. Lee to develop guidance that can be used on a site-specific basis to determine whether the sediments from a particular location could be safely used to enhance Delta levee stability and/or provide additional SWH.

Approach

Dr. G. Fred Lee will work with CALFED/DWR management and others to develop guidelines that could more appropriately and reliably evaluate whether chemical contaminants, such as heavy metals, chlorinated hydrocarbons, nutrients, PAH's and salts, present in dredged sediments would be adverse to local ecosystem quality and/or Delta water quality when used for either Delta LE or the development of SWH. Dr. Lee is familiar with the literature and the vast amount of work that has been done through the Corps of Engineers and others on the disposal and beneficial uses of contaminated dredged sediments. He is also familiar with the significant technical problems that exist today in regional water quality control board regulatory approaches for evaluating the potential water quality and ecological problems that could develop from the use of dredged sediments that contain one or more potential pollutants.

Dr. Lee will develop a discussion of the technical problems in using contaminated dredged sediments for Delta LE or SWH. This review will include a discussion of the various perspectives of those interested in these areas, such as those wishing to use contaminated sediments for LE or SWH development, regulatory agencies that must protect public health, environmental quality and water resources, agricultural interest that could be impacted by contaminants in dredged sediments and environmental groups as well as others who are interested in this area. Dr. Lee's review would also specifically include a discussion of the current regulatory approaches being used in the Delta that govern both the use of contaminated sediments for LE as well as for the development of SWH. His review will provide guidance on how the regulatory guidelines and approaches could be changed to protect the beneficial uses of the Delta system associated with the use of certain types of contaminated dredged sediments within the Delta for LE and/or SWH development.

Dr. Lee will organize a panel of interested parties to provide guidance on the development and implementation of one or more demonstration projects that would specifically address data gaps that exist on the expected behavior and impacts of various types of contaminants in dredged sediments when used for LE and SWH. Dr. Lee and this panel will serve as advisors to CALFED/DWR on implementing and conducting the site specific studies needed to proceed with the beneficial use of contaminated dredged sediments in the Delta in a technically valid, cost effective manner that will protect Delta aquatic resources, water quality and aquatic and terrestrial ecosystems.

Project Location

The project will be conducted within the Delta at locations to be selected by CALFED/DWR where there is potential interest in levee enhancement and/or shallow water habitat development. Also, the project will be conducted at those areas within the Delta and Bay where navigational channel dredging could take place that would yield sediment that could potentially be used for LE and SWH.

Expected Benefits and Need for Project

The results of this project are urgently needed by CALFED/DWR and others who are concerned with enhancing Delta levee stability and developing shallow water habitat. The primary benefits from this project will be the formulation of a consensus approach covering the beneficial uses of contaminated dredged sediments within the Delta. Without the results of this project, it is expected that the CVRWQCB and others concerned with protection of Delta water quality and aquatic resources will continue to be highly reluctant to approve the use of contaminated sediment for beneficial uses in the Delta. This project will provide the technical information base that is now needed to overcome the current obstacles to the use of contaminated dredged sediments for LE and SWH.

I-004550

Proposed Scope of Work

The initial phase of this three year project will be devoted to development of a draft consensus document covering the various issues that need to be resolved in order to permit the beneficial uses of contaminated dredged sediments within the Delta. It is expected that within a four month period, Dr. Lee will develop a draft proposed consensus document covering these issues. This draft consensus document will present a discussion of issues from the various perspectives based on a review of the literature, the basic science and engineering issues that need to be considered and the views of various stakeholders concerned with managing contaminated sediments, enhancing Delta levee stability and protection of Delta water quality, ecosystems and aquatic resources. Dr. Lee will plans to organize a workshop at which all interested parties could meet and discuss these issues.

The draft proposed consensus statement of issues would include a proposed course of action that CALFED/DWR et al. could follow to address the issues of concern to the stakeholders through the development of site specific studies that would be specifically designed to fill information gaps. These studies would likely be funded by CALFED and/or DWR in the form of demonstration projects in which contaminated sediments from a particular dredged channel would be deposited on existing levees or in areas where shallow water habitat enhancement is proposed. A comprehensive monitoring program would be conducted to determine the constituents released or otherwise made available from the contaminated dredged sediments, the rate of release and the potential water quality significance of such release. These demonstration projects would be of sufficient magnitude to reliably predict full scale levee enhancement and shallow water habitat development without causing significant adverse harm to Delta water quality or ecosystems. They would incorporate the vast amount of work that the Corps of Engineers and others have done in various parts of the US concerned with beneficial uses of dredged sediments.

It is anticipated that one or more of these projects could be started during the second year of this proposal. Dr. Lee would work with CALFED/DWR management in finding investigators who could conduct the studies in an appropriate manner. He would act as liaison between those doing the studies and CALFED/DWR management. As both the CALFED/DWR studies results and as new information from literature based on studies conducted at other locations devoted to investigating the beneficial uses of contaminated dredged sediments become available, Dr. Lee would update the consensus guidance document to refine the guidance on beneficial uses of contaminated dredged sediments within the Delta.

Monitoring and Data Evaluation

A key component of this project will be the development of a monitoring program that would enable CALFED/DWR and others to reliably assess the potential adverse impacts as well as the necessary management approaches associated with the use of contaminated dredged sediments for levee enhancements and/or shallow water habitat development. This monitoring program will conform to CALFED WQTG Draft and subsequent revisions of the Draft Framework for the

CALFED Bay-Delta Program Comprehensive Monitoring, Assessment, and Research Plan that was recently released for public comment.

Implementability

The results of this project are expected to be fully implementable since all stakeholders in this matter will be actively involved in developing the guidance for the use of contaminated dredged sediments for enhancing Delta levee stability and developing additional shallow water habitat within the Delta.

Costs and Schedule

Budget

The proposed budget for the first year of this project is presented in Table 1. The project can be implemented as soon as funds are made available. The anticipated funding levels for the second and third years are the same as for the first. As indicated in Table 1, the CALFED/DWR funds will be used to support Dr. Lee's activities presented in the Scope of Work in which he serves as a technical resource and high level technical expertise facilitator and synthesizer of information from the literature and recent and ongoing studies that can be used to formulate a CALFED/DWR strategy for enhancing levee stability and developing shallow water habitat using contaminated dredged sediments that will protect Delta water quality, aquatic resources and ecosystems without significant unnecessary expenditures for contaminant control.

Discussion of Budget

Dr. Lee proposes to spend an average of one ten-hour day per week devoted to this project. He has proposed to adjust his normal consulting rate from the current $225 per hour to $100 per hour for this project. He will, therefore, donate $65,000 in support of CALFED/DWR activities during the course of this project. This will be Dr. Lee's cost-share contribution for the project. Actually, Dr. Lee's cost-share contribution for the project will likely be greater than this amount, as a result of his donating time needed to accomplish the goals of the project beyond that for which he is compensated by project funds.

The billing rates for Dr. Lee are rates which include his total costs except for project employees, supplies, and travel. There are no overhead/indirect costs, multipliers, fees or separate profit items associated with these rates. Since this is basically a consulting contract, which provides funds to enable Dr. Lee to serve as a consultant to CALFED/DWR, this budgeting approach is appropriate for this project. It is the same budgeting approach that Dr. Lee has been using with governmental agencies, industry and others in similar types of consulting activities over the past 30 years.

While no funds are budgeted for the support of Dr. Anne Jones-Lee (Dr. G. Fred Lee's wife), she will, as needed, be an active participant in the project. Her activities will be primarily focused on providing advice on the aquatic biology/aquatic toxicology components of the project, as well as in the project report preparation. Her PhD dissertation was devoted to the release of phosphorus from contaminated dredged sediments as it may impact the beneficial uses of the waterbodies in which the sediments are deposited. She will donate her time on behalf of the project as needed.

Schedule Milestones

The anticipated milestones for this activity have been presented and discussed under **Scope of Work**. There are no third party impacts from this project that would require mitigation.

Table 1

Budget
Year One of a Three Year Project

Budget period is one year.
The project can be initiated upon award of contract.

Personnel:

Dr. G. Fred Lee, PhD, DEE		
10 hrs/week for one year @ $100/hr.	$52,000.00	
Hourly help		
500 hrs @ $18/hr.	9,000.00	
Secretarial		
250 hrs @ $15/hr.	3,750.00	
Total Personnel		$64,750.00

Expenses

Travel: Miscellaneous travel Sacramento region	300.00	
Telephone/Fax/Photocopies	4,500.00	
Total Travel and Supplies	$4,800.00	

Total Budget: **$69,550.00**

The anticipated budgets for the second and third year of this project are expected to be approximately the same as the first year's budget.

Qualifications

For a 30 year period, until 1989, Dr. Lee taught graduate environmental engineering and environmental science courses at several major US universities. During this time, he conducted over five million dollars in research devoted to defining the sources, water quality and public health significance, and developing control programs for chemical constituents in aquatic systems. He has published over 650 papers and reports on his work. Since 1989, he has been a full-time consultant to governmental agencies and industry in the US and other countries. One of his primary areas of activity during his 37 year career has been managing contaminated aquatic sediments. Most of his work in this area has been concerned with the management of contaminated dredged sediments. He has conducted over a million dollars in research in this topic area and was instrumental in the development and evaluation of the Corps/US EPA procedures that are now used for regulating open water disposal of contaminated dredged sediments. He is also familiar with upland disposal of dredged sediments as they may impact water quality due to contaminants in the sediments.

Beginning in the 1970s when Dr. Lee held the position as director of the Center for Environmental Studies at the University of Texas at Dallas, he helped the US Army Corps of Engineers Waterways Experiment Station formulate the Dredged Material Research Program. Dr. Lee served as a member of the advisory panel for that program, which was a $35 million, five-year effort devoted primarily to evaluating the water quality significance of chemical contaminants in dredged sediments as they impact the method of disposal. During that time, Dr. Lee conducted over $1 million in research on behalf of the Corps devoted to developing dredged sediment disposal criteria. The criteria that evolved out of his work are being used today by the US EPA and Corps of Engineers to regulate contaminated dredged sediments with respect to open water disposal of these sediments. Through the 1980s and still today Dr. Lee continues be active in the contaminated sediments area.

One of his first consulting jobs when he moved back to California in 1989 was work with the Port of Oakland in which he reviewed work that had been done by the Corps of Engineers' Waterways Experiment Station in evaluating the potential water quality impacts of the use of Oakland Inner Harbor dredged sediments for levee restoration/enhancement. From this work, it appeared that it would be possible to use contaminated sediments for levee enhancement; however, there was need to do additional work to answer some yet unresolved questions about it.

Another of his 1989 initial consulting jobs was work on water quality issues within the Delta where he became highly familiar with the Delta island channel water quality issues. Over the years, Dr. Lee has continued to be active in Delta water quality issues through serving on various committees, such as the Source Water Quality Committee for the California/Nevada American Water Works Association Section where he has developed reports on behalf of this committee concerned with water quality.

Dr. Lee is highly familiar with wetland water quality issues. While teaching at the University of Wisconsin in the 1960s, his graduate students and he conducted the first work ever done on

freshwater wetlands water quality issues. His work has included serving as an advisor to the state of Florida in the restoration of the Kissimmee River wetlands system as part of improving water quality in Lake Okeechobee. He has also done considerable work on marine wetlands issues and has been involved in the review of a number of Corps of Engineers' wetlands development projects using dredged sediments.

A key component of this proposed project is the development of a number of issue papers which represent consensus discussions pertinent to providing guidance on the development and implementation of a CALFED/DWR policy governing the beneficial uses of contaminated dredged sediments within the Delta. The development of consensus issue papers requires that the developer have high expertise in the field and be able to present a discussion of key issues in an issue paper on the topic. These are areas in which Dr. Lee has extensive experience and expertise. One of Dr. Lee's primary interests is working toward the incorporation of good science and engineering into formulation of public policy for water quality management. His extensive past and current publication productivity demonstrates his interest and effectiveness in developing technical materials that can be used to formulate technically valid, cost-effective public policy for environmental quality management.

Dr. Lee has extensive experience in developing programs of this type and as serving as a member on expert panels on major water quality management issues. Dr. Lee has a unique background in the sciences and engineering pertinent to the successful completion of this project. Also, his longstanding interest in formulating and implementing technically valid, cost-effective water pollution control programs provides him with the necessary expertise and experience to make a unique contribution to CALFED/DWR in formulating and implementing a strategy for the beneficial use of contaminated dredged sediments in the Delta. Additional information regarding Dr. Lee's expertise and experience pertinent to this project is included in his web site (http://members.aol.com/gfredlee/gfl.htm).

Dr. Lee does not have a conflict of interest and will not accept consulting assignments that could be viewed as a conflict of interest before completion of this project and work with another client.

Compliance with Standard Terms and Conditions

Dr. Lee does not anticipate any problems complying with Terms and Conditions set forth in Attachment D to the RFP.